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but there is a summary in German, the principal features of which are as follows: Among the seed plants there is an evident tendency to reduce the male gamete so that the male cytoplasm does not take part in fertilization. In this reduction the binucleate generative cell has played an important part. Its appearance in the gymnosperms (Abietineae, some Taxaceae, Gnetales) is accompanied by a constantly increasing disorganization of the male cytoplasm, which finally leads to the naked sperm nuclei of the higher angiosperms. The species of *Juglans* studied have binucleate generative cells which reach the embryo sac without disorganization, and correspond exactly to the binucleate generative cells of certain gymnosperms. In this feature, therefore, these species occupy an intermediate position between gymnosperms, in which the cytoplasm reaches the egg cell, and the higher angiosperms, in which the male cytoplasm disorganizes in the pollen tube or even in the pollen grain.

The persistence of the male cytoplasm in *Juglans* is thought to be a primitive character retained from their gymnosperm ancestors, and the appearance of this character in chalazogams is said to be significant and is a further proof of the great age of these plants. The tendency in seed plants to reduce the male gametes seems correlated with the appearance of the pollen tube, for the simplification of the male gametes goes hand in hand with the evolution of the pollen tube.

While some of these conclusions seem rather arbitrary, the progressive reduction of the male gametes is a fact which all must recognize. Criticisms are left for those who can read the full paper.—CHARLES J. CHAMBERLAIN.

**Winter condition of brown rots.**—Conflicting and uncertain statements n the literature regarding the manner in which the fungi producing the brown rots of stone-fruits and pomaceous fruits live through the winter have led EWERT[20] to study the behavior of the conidia of these fungi with regard to their capacity for persisting through the winter. The rarity of the apothecia makes it improbable that these play an important part in maintaining the brown rot fungi.

EWERT finds that the two species of brown rot fungi, *Monilia cinerea* and *Monilia fructigena*, differ radically in their mode of passing the winter, a fact which may account for the discrepancies in the literature, since most of the conflicting statements regarding the persistence of the spores during winter were made before WORONIN had shown that the two species are clearly distinct. EWERT finds that the conidia of *Monilia cinerea*, which occurs primarily on stone-fruits but which can also infect pomaceous fruits, are capable of germinating at any time during the winter. They persist during the winter in the spore-cushions on mummies of cherries, plums, and other stone-fruits, and also on pomaceous fruits if these happen to be infected. Exposure to temperatures much lower than those which occur annually at PROSKAV, where the investigations were made, did not injure the germinative capacity of the spores. The mycelium also remains alive and produces new spore-cushions in the spring.

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[20] EWERT, E., Verschiedene Überwinterung der Monilien des Kern- und Steinobstes und ihre biologische Bedeutung. Zeitschr. Pflanzenkrank. 22:65–86. 1912.

The conidia of *Monilia fructigena*, which occurs chiefly on pomaceous fruits, lose their capacity for germination very early in the winter. The fungus persists solely by means of the mycelium. New spores are produced in the spring, when the mummies covered with the crust-like spore-cushions are soaked and kept in a warm place.

The twig-blight of stone-fruits, which flower early in the season, is caused entirely by *Monilia cinerea*, whose spore-cushions are produced much earlier than those of *M. fructigena*. The spores of *M. fructigena* are not formed at the flowering time of the stone-fruits.—H. HASSELBRING.

**Ecology of mosses.**—A careful study of the mosses of Isle Royale, Mich., by COOPER[21] proves that there is a well marked succession extending from pioneer conditions to the establishment of the climax forest. From beginnings both upon the rock shore and in the bogs two distinct lines lead to the same climax, characterized by *Calligeron Schreberi*, *Hylocomium proliferum*, and *Hypnum cristacastrensis* as dominant species. The importance of mosses as pioneers upon bare rock surfaces and in peat bogs has long been recognized, but the present study shows that they are of equal importance in the climax forest in promoting the accumulation of humus and in the conservation of soil moisture. This investigation represents a new departure in the field of ecology, and proves not only that the same general laws of succession hold among bryophytes as among seed plants, but that these plants of lower rank may often serve as indicators of the advancement attained by any particular forest association. This latter feature may prove of the greatest value in the study of our northern forests, where the number of tree species is reduced to a minimum.—GEO. D. FULLER.

**Calcium-magnesium ratio.**—LOEW[22] calls attention to the fact that the results obtained by MEYER and LEMMERMAN in their work on the calcium-magnesium ratio do not agree with those previously worked out by himself. He claims that the results obtained by them were due to the fact that the soi was insufficient in amount for the number of plants grown. The dry weight of their plants was only half the weight of plants grown under ordinary conditions. This dwarfing was due to the arresting of root growth, and no conclusion can be drawn concerning the calcium-magnesium ratios from plants grown under crowded conditions.—JOHN N. MARTIN.

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[21] COOPER, WILLIAM S., The ecological succession of mosses as illustrated upon Isle Royale, Lake Superior. Plant World **15**: 197–213. 1912.

[22] LOEW, OSCAR, Über angebliche Widerlegung der Lehre vom Kalkfaktor. III. Landwirtschaftl. Jahrb. **42**: 181–192. 1912.